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A SPACE SAVING BATH ASSEMBLYTECHNICAL FIELD

This invention relates to a space saving bath assembly which is particularly suitable for use in confined spaces, for instance small units, caravans, boats and cabins. The assembly provides for a bath which is length adjustable and can protrude into a space when in use to allow for use of the bath in the conventional manner, but where the bath can be retracted to allow the space to be used for other purposes. In particular, the assembly provides for a more or less full sized shower and a more or less full sized bath but where the bath is length adjustable and can protrude into the shower recess to allow the bath to be used more or less as a conventional size bath, but where the bath can be retracted to sit next to the shower recess to provide a more or less full size shower recess.

BACKGROUND ART

There is a desire to save space while having a conventionally sized bath in dwelling and, in particular, to have a normal shower recess and a conventionally sized bath in dwellings. For larger sized dwellings, for instance a typical house, there is enough room to have a separate full length bath and a separate full sized shower recess. Combination baths and showers are known where the shower is no more than a shower rose above the bath and a shower curtain or rigid partition is used to prevent water from spilling out of the bath. These combinations are not particularly suitable for older people or mobility impaired people as moving in and out of the bath presents difficulties. It is also known to have shower tubs which consist of a standard shower recess (typically 900mm by 900mm) but where the floor of the shower is a small bath tub. Again, this presents a quite high step which is difficult for mobility impaired people and, in any event, the bath tub is so small to be practically useless.

In smaller areas, for instance caravans, boats,

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small units and cabins, a conventional shower must usually be installed as there is usually insufficient room for a full size bath.

DISCLOSURE OF THE INVENTION

5 The present invention is directed to a space saving bath assembly and, more particularly, to a combination shower and bath assembly which can provide a conventional shower recess and a full size bath and where the bath is length adjustable to provide a space saving
10 combination. This assembly is suitable for installation into boats, caravans and the like where previously it was not possible to have a full size bath and, more particularly, a standard shower and a full size bath.

 According to a first aspect of the present
15 invention there is provided a space saving bath assembly which has a length adjustable bath, the bath being adjustable between a retracted, shorter position where the bath is adjacent a space and does not protrude into the space, and a longer, extended position where a portion of
20 the bath extends into the space thereby allowing a person to bathe in the bath.

 According to a second aspect of the present invention there is provided a space saving combination shower and bath assembly which has a shower recess and a
25 length adjustable bath, the bath being adjustable between a retracted shorter position where the bath is adjacent the shower recess and does not protrude into the shower recess, and a longer extended position where a portion of the bath extends into the shower recess thereby allowing a
30 person to bathe in the bath.

 Preferably, the bath has a fixed portion which remains fixed adjacent to the space or shower recess and moveable portion which can move into the space or shower recess to lengthen the bath. Advantageously, the fixed
35 portion of the bath has an overlying platform which is moveable between an overlying position when the bath is in the shorter position and an away position when the bath is

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in the extended position to allow full access to the bath.

The assembly is suitable for installation into small areas and therefore finds particular suitability in boats, caravans, cabins and small units.

5 Advantageously, the assembly is modular in nature to allow for easy installation. Typically, it has a single inlet from each of the hot and cold taps and a single outlet for waste water. Advantageously, the inlet from the hot and cold taps may be a flexible plastic hose
10 adapted at one end to engage conventional plumbing fittings.

The shower recess can otherwise be of more or less conventional type, which may have a footprint of about 900mm by 900mm, a typical height of about 1.8 to 2 m
15 and a floor which does not have an appreciable raised edge and therefore is more easily accessible by children, mobility impaired people and the like. The shower recess can be formed of fibreglass, plastics, metal, cementitious sheeting and the like. The shower recess can be fitted
20 with a conventional sliding front door, swing front door or a shower curtain.

The assembly may have a length adjustable bath, adjustable through intermediate lengths and not just to its full length. The bath, when fully extended, can have
25 a length of 1.5 to 2 m but it should be appreciated that this can vary to suit. By having the bath adjustable in length, it can be extended to less than its fully extended position (for example, to bathe children) which means that less water can be used.

30 In one form, the bath has a fixed portion and a moveable portion and typically the fixed and moveable portions are approximately equal in size with the moveable portion being moveable being relative to the fixed portion. The fixed portion sits adjacent the shower
35 recess and can have a length of approximately 500mm to 1m which means that together with the shower recess, the entire length can be between 1.5 to 2 m and preferably

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about 1.7 m. It can be seen that this allows the assembly to be fitted into quite a small area.

The moveable portion of the bath may slide out on runners. In this embodiment of the invention, a roller or
5 rollers mounted to the moveable portion of the bath and arranged so as to run along a surface of the fixed portion may be provided to assist in the sliding movement. The roller may locate in spaced apart slots formed on one side of the fixed portion of the bath, with one slot typically
10 corresponding to a fully retracted position for the moveable portion of the bath and another to a fully extended position for the moveable portion of the bath. One or more slots may be located between those of the extremities to allow for adjustment to intermediate
15 lengths.

Alternatively, a roller or rollers may be fixed to the base of the moveable portion and arranged so as to run along the surface that supports the bath, in order to allow for extension of the bath.

20 Alternatively, when the bath is extended the moveable portion may be cantilevered or supported by a support member at the foot of the bath.

Typically locking means are provided to ensure that the moveable portion of the bath cannot move while in
25 use.

Typically said locking means secure the moveable portion of the bath in a position in which sealing means prevents leakage of water from the bath.

Advantageously, said locking means and said
30 sealing means are combined, for example, through the use of a compression latch to secure a sealing portion of the moveable portion of the bath to a sealing portion of the fixed portion of the bath.

The bath, when moved into the extended position,
35 extends into the adjacent space or shower recess to take advantage of this otherwise empty area. When the bath is in the extended position, a person can bathe in the normal

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manner but may also still have a shower in the bath if the shower rose is positioned in a suitable orientation. This means that the assembly can be a standard shower, a standard bath, and a combination bath shower which provides great versatility in use.

The bath may also have conventional spa jets and a spa pump attached in order that it may be used as a spa tub when in the extended position. .

When the bath is in the retracted, shorter position, it is adjacent the space (which is occupied by the shower recess in preferred forms of the invention) and does not protrude appreciably, or at all, into the space. By this is meant that when the bath is in the retracted position, whatever occupies the space (for example the shower recess) can be used in the normal manner. It will be appreciated that there is a seal between the fixed portion of the bath and the side wall of the shower recess in order that leakage from the shower will not occur.

It is preferred that the fixed portion of the bath is housed in a cabinet-type arrangement. In this arrangement, an overlying platform can be provided which sits next to the shower recess and which overlies the bath.

The platform can be load bearing and can be used as a baby change platform, a platform to hold towels, washing and the like.

The platform may form part of a sink assembly which means that a basin may be fitted in the platform and taps may be provided to provide a wash basin next to the shower recess and which sits above the bath. Alternatively, the platform and sink assembly may be separate items, which may be in substantially horizontal alignment.

In order to allow full access to the bath, the overlying platform can be moved to an away position such that the length of the bath is accessible. In an embodiment, the platform can be hinged to allow it to

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swing to its away position to allow access to the bath.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention will now be described, by way of example only, with reference to
5 the following drawings, in which:

Figure 1 is a perspective view of a combination shower and bath assembly according to an embodiment of the present invention;

Figure 2 is a view similar to Figure 1 but
10 showing the combination shower and bath assembly with the bath extended;

Figure 3 is a view similar to Figure 1 with the bath in the extended configuration and additionally showing a spa arrangement;

Figure 4A shows a length adjustable bath in accordance with the present invention in a retracted configuration;

Figure 4B shows the bath of Figure 4A in an extended configuration;

Figure 5A is a side elevation of the bath shown in Figure 4A;

Figure 5B is a side elevation of the bath shown in Figure 4B;

Figure 6A is a section through the bath shown in
25 Figures 4A and 5A highlighting the cantilever arrangement which supports the moveable portion of the bath when in the extended configuration;

Figure 6B shows the bath of Figure 6A in the extended configuration;

Figure 7A shows a variant of the bath of Figure
30 6A;

Figure 7B shows the bath of Figure 7A in the extended configuration;

Figures 8A, 8B and 8C show the detail of the
35 compression latch arrangement employed in one embodiment of the invention to seal and lock the bath in the extended configuration;

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Figure 9 shows the plumbing arrangement employed in installing a combination shower and bath assembly according to an embodiment of the invention, with the shower and bath assembly omitted for the sake of clarity;

5 Figure 10A shows a bath in accordance with an alternative embodiment of the invention; and

Figure 10B shows the bath of Figure 10A in the extended configuration.

MODES FOR PERFORMING THE INVENTION

10 Referring to Figures 1 to 3 and 9, there is illustrated a space saving combination shower and bath assembly which can be fitted into confined spaces and is suitable for boats, caravans, cabins, small units and the like. In Figures 4 to 8 the operation of a space saving
15 bath assembly which can be fitted into confined spaces and is suitable for boats, caravans, cabins, small units and the like in order to optimise usage of space therein is illustrated. The embodiments of the invention illustrated in Figures 4 to 9 are a more general form of the invention
20 illustrated in Figures 1 to 3, hence the same reference numerals shall be used for similar features.

The assembly shown in Figures 1 to 3 and 9 has a shower recess 10 and a length adjustable bath which, when in the retracted position, sits in an adjacent decorative
25 cabinet 11. Shower recess 10 can be of more or less conventional design and can have a footprint of approximately 900 mm by 900mm. The shower recess can have a front sliding glass door 12 but it should be appreciated that this is an embodiment only and a swing door, shower
30 curtain or any other suitable screen can be used. The shower recess can be formed from fibreglass, laminates, plastics, cementitious panels or other suitable building components. In the embodiment, a shower rose 13 is fitted in an upper portion of the rear wall and hot and cold taps
35 13a and 13b therebelow.

One difference between the shower assembly according to the invention and conventional shower

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assemblies is that the side wall 14 which is adjacent cabinet 11 can be opened to allow proper access to the bath. In the embodiment, side wall 14 has a glass door (not seen) which is hinged inwardly to open, but it may also have a pull curtain, roller blind, shutter or other type of screen which can be opened or removed when the bath is desired to be used. On the other hand, when the shower is used, the pull curtain etc. can be pulled down to prevent shower water from being sprayed out of side wall 14.

In the embodiment, above cabinet 11 is a platform 15 adjacent a wash basin 16. The wall behind platform 15 has hot and cold water taps 17a and 17b and a nozzle 17 to fill wash basin 16. Cabinet 11 can have underneath doors (not shown) to provide a storage area of sorts if desired.

Platform 15 is hinged by hinges (not shown) and can be hinged upwardly to a substantially vertical position where it sits against the wall behind it, which itself may be provided with an attachment (not shown) which attaches to a complementary attachment (not shown) on platform 15 to hold the platform in the upright position.

As best seen in Figure 2, this allows for access to the bath when it is in the extended configuration.

With reference to Figure 3, it will be appreciated that a spa pump 18 may be placed within the cabinet 11 (not shown in Figure 3). The spa pump 18 has an outlet manifold 19 through which water may be pumped into the bath through the jets 21 characteristic of spa baths. It also has an inlet 20 through which water drains from the bath back to the spa pump for circulation through the pump back into the bath. With the exception of the use on a length adjustable bath of the type described above, the components of the spa bath are conventional.

Referring now to Figures 2 and 3, it can be seen that the bath has a first fixed portion 22 and a second moveable portion 23. Figures 4, 5, 6 and 7 show how the

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bath can move between a shortened position where moveable portion 23 is positioned within fixed portion 22 (see Figure 4A, 5A, 6A and 7A), and an extended position (see Figure 4B, 5B, 6B and 7B) where the moveable portion 23 is pulled, in preferred embodiments of the invention, substantially into shower recess 10.

In a space saving bath and shower combination, when the bath is in the extended position illustrated in Figures 2 and 3, platform 15 can be hinged upwardly and fixed to attachment 20 and the glass door in side wall 14 opened to present a full length bath which can be accessed via door 12 or simply stepped into through the top of now open cabinet 11. Nozzle 17 can now be used to fill the bath as can shower rose 13 which provides quite good versatility to the bath.

In a form of the invention (as best seen in Figures 6 and 9), the shower base 23 extends to a point where leaks from the bath drain into the shower base and thence through outlet 24 from the shower recess 10. It is also to be noted that the outlet 26 from the basin 16 meets the outlet 25 from the bath and outlet 24 in order to combine the waste water outlets. Pipe 24 may be plumbed into existing plumbing in a conventional manner, as only one outlet connection need be made. It is also to be noted from Figure 9 that flexible plastic hoses 27, 28 connected to conventional plumbing outlets provide hot and cold water respectively for the shower rose 18 and the nozzles 17 through pipes 29, 30. Alternatively a drip tray may be provided beneath the bath.

Figures 4 to 7 illustrate a generalised form of the invention in which a length adjustable bath may protrude into a space adjacent the bath, which in the embodiment illustrated in Figures 1 to 3 and 9 would be occupied by a shower recess. The relationship between the bath in its retracted configuration and in its extended configuration is easily seen through a comparison of Figures 4A to 4B, 5A to 5B, 6A to 6B and 7A to 7B.

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The arrangement shown in Figures 4, 5 and 6 will now be described, followed by the variant shown in Figure 7.

With reference to Figure 6, the fixed portion 22 of the bath is supported by a frame 31 which rests upon the floor of the room or area in which the bath is to be positioned. The moveable portion 23, as best seen in Figure 4a, nests within the fixed portion 22 when the bath is in the retracted position. A rim 33 on the moveable portion 23 rests above a rim 32 on the fixed portion 22. As best seen in Figure 5, a roller 34 is affixed to the underside of rim 33 by its stem portion and has its wheeled portion resting upon the upper side of the rim 32 around the fixed portion 22. It will be appreciated that, when moving from the position shown in Figure 5A to the position shown in Figure 5B, the wheeled portion of the roller 34 rolls along the rim 32. Although not shown, grooves may be formed in the rim 32 in order to locate the roller in a desired position.

The bath shown in Figure 4 and 5 also has a base portion 35 which serves, as best seen in Figure 1, when the bath is in the retracted configuration as a portion of the side wall of the shower cubicle and creates a seal therewith to allow for use of the shower. In addition, a runner 36 is secured at right angles to the interior face of the base portion 35 in order to facilitate extension of the bath. In the particular embodiment shown in Figure 4, runner 36 is a multi-stage runner having further nesting runners 37, 38 and operates in the conventional manner.

Figure 6 shows that the fixed portion 22 is supported by the frame 31, but the moveable portion 23 is not supported. Instead, it is rigidly clamped in the extended position, in a manner to be described below, and thus is a cantilevered arrangement. In contrast, the variant shown in Figure 7 provides additional support, in this case rubber foot 42 at the base of base portion 35, to support the moveable portion 23.

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In the alternative embodiment shown in Figure 10, runners are not used to facilitate extension of the bath. Instead, a roller or rollers 53 is/are secured to the base portion 35 and it rolls along the shower base to
5 facilitate extension.

A plurality of compression latches are used to secure and seal the bath in the extended position. The compression latches are recessed in cavities 40 and 41 on an end face 43 of the moveable portion 23 (as best seen in
10 Figure 4B), and corresponding recesses 40a and 40b are formed in the other end face 43a. Compression latches such as SOUTHCO medium-sized or large-sized compression latches are suitable. The manner in which these operate is illustrated in Figure 8, which may be taken to be the
15 compression latch in recess 40a, but could be any of the others also. It will be appreciated with reference to Figure 8A that recess 40a extends into the page, the view being a section through recess 40a and the side walls 44, 45 of the moveable fixed portion 22 and moveable portion
20 23, respectively. In Figure 8A the bath is shown in a nearly fully extended configuration, and it can be seen that a flange 47 on the very end of side wall 44 of the fixed portion 22 is now closely juxtaposed to a sealing portion 48 of the side wall 45 of moveable portion 23. As
25 seen in the progression from Figure 8A to Figure 8B, further movement of the moveable portion 23 brings sealing portion 48 of the side wall 45 of moveable portion 23 very close to the flange 47 on the side wall 44 of fixed portion 22, indeed the seal 46 located within a recess in
30 sealing portion 48 abuts flange 47. Once the moveable portion 23 is brought into this configuration, the handle 50 of the compression latch, generally indicated as 49, is rotated and this brings pawl 51 into the position shown in Figure 8B. In a typical compression latch the rotation is
35 through 90 degrees, and it will be appreciated that corresponding rotation of the pawl 51 through 90 degrees occurs, as they are fixedly connected through shaft 52.

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This brings the pawl 51 into a position where it will provide a physical barrier to reversal of the movement of the moveable portion 23 from the position shown in Figure 8B back to the position shown in Figure 8A, therefore the bath is secured in the extended position but not yet latched, nor is a seal yet created.

Further operation of the compression latch in the conventional manner by easing the handle 50 from the extended configuration shown in Figure 8B to the depressed configuration shown in Figure 8C (in which the length of the handle extends into the page) serves to, in a manner well understood by the person skilled in the art, draw the pawl 51 against flange 47 and pull the flange 47 hard against sealing portion 48. This serves to compress seal 46 and thereby prevent the flow of water past the seal. The bath is therefore latched in the extended configuration and sealed at the join between the moveable portion 23 and fixed portion 22.

It should be appreciated that various other changes and modifications can be made to the embodiment described without departing from the spirit and scope of the invention as claimed.

INDUSTRIAL APPLICABILITY

The space saving bath assembly is useful in allowing a full length bath to be used in confined spaces where only a conventional shower could otherwise be installed.

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CLAIMS:

1. A space saving bath assembly which has a length adjustable bath, the bath being adjustable between a retracted, shorter position where the bath is adjacent a space and does not protrude substantially into the space, and a longer extended, position where a portion of the bath extends into the space thereby allowing a person to bathe in the bath.

2. A space saving bath assembly as claimed in claim 1 wherein the bath has a fixed portion which remains fixed adjacent to the space and a moveable portion which can move into the space to lengthen the bath.

3. A space saving bath assembly as claimed in claim 2 wherein the moveable portion nests within the fixed portion when the bath is in the retracted configuration.

4. A space saving bath assembly as claimed in claim 3 wherein the moveable portion employs a runner arrangement to allow for sliding movement into the extended configuration.

5. A space saving bath assembly as claimed in claim 4 wherein a roller secured to the moveable portion and arranged so as to run along a rim formed around the edge of the fixed portion facilitates extension of the bath.

6. A space saving bath assembly as claimed in claim 5 wherein slots are formed in the rim at predetermined locations in order to locate the roller and thereby retain the bath in a desired position.

7. A space saving bath assembly as claimed in any one of claims 4 to 6 wherein a multi-stage runner arrangement is employed.

8. A space saving bath assembly as claimed in claim 3 wherein the moveable portion is rolled into the extended configuration on rollers.

9. A space saving bath assembly as claimed in any one of claims 3 to 8 wherein the moveable portion is

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cantilevered.

10. A space saving bath assembly as claimed in any one of claims 3 to 8 wherein the moveable portion is supported by a support member when in the extended
5 configuration.

11. A space saving bath assembly as claimed in claim 10 wherein the support member is an upright member affixed to the end of the bath, and which extends downwardly from the bath to make contact with a support
10 surface.

12. A space saving bath assembly as claimed in any one of claims 3 to 11 wherein a plurality of compression latches are used to latch and seal the bath in the extended configuration.

13. A space saving bath assembly as claimed in any one of claims 1 to 12 wherein the assembly is a modular unit.

14. A space saving bath assembly as claimed in claim 13 wherein the modular unit is mounted upon a frame.

15. A space saving bath assembly as claimed in claim 13 wherein said frame incorporates a drip tray.

16. A space saving bath assembly as claimed in claim 15 wherein waste water from said drip tray is combined with waste water from other outlets into a single
25 waste water outlet.

17. A space saving bath assembly as claimed in any one of claims 13 to 16 wherein the arrangement includes a hot water inlet and a cold water inlet adapted for fitment to conventional plumbing fittings.

18. A space saving bath assembly as claimed in any one of claims 1 to 17, further comprising a spa pump and conventional spa fittings.

19. A space saving bath assembly as claimed in any one of claims 2 to 18 wherein the fixed portion of the
35 bath has an overlying platform which is moveable between an overlying position when the bath is in an extended configuration and an away position when the bath is in the

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extended configuration to allow access to the bath.

20. A space saving bath assembly as claimed in claim 19 wherein the fixed portion of the bath is housed in a cabinet.

5 21. A space saving bath assembly as claimed in claim 20 wherein the platform is load bearing.

22. A space saving bath assembly as claimed in claim 21 wherein the platform forms part of or is adjacent to a sink assembly.

10 23. A space saving combination shower and bath assembly which has a shower recess and a length adjustable bath, the bath being adjustable between a retracted, shorter position where the bath is adjacent the shower recess and does not protrude substantially into the shower
15 recess, and a longer, extended position where a portion of the bath extends into the shower recess thereby allowing a person to bathe in the bath.

24. A space saving combination shower and bath assembly as claimed in claim 23 wherein the bath has a
20 fixed portion which remains fixed adjacent to the shower recess and the moveable portion which can move into the shower recess to lengthen the bath.

25 25. A space saving bath assembly as claimed in claim 24 wherein the moveable portion nests within the fixed portion when the bath is in the retracted configuration.

26. A space saving bath assembly as claimed in claim 25 wherein the moveable portion employs a runner arrangement to allow for sliding movement into an extended
30 configuration.

27. A space saving bath assembly as claimed in claim 26 wherein a roller secured to the moveable portion and arranged so as to run along a rim formed around the edge of the fixed portion facilitates extension of the
35 bath.

28. A space saving bath assembly as claimed in claim 27 wherein slots are formed in the rim at

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predetermined locations in order to locate the roller and thereby retain the bath in a desired position.

29. A space saving bath assembly as claimed in any one of claims 26 to 28 wherein a multi-stage runner
5 arrangement is employed.

30. A space saving bath assembly as claimed in any one of claims 23 to 25 wherein the moveable portion is rolled into the extended configuration on rollers.

31. A space saving bath assembly as claimed in
10 any one of claims 25 to 30 wherein the moveable portion is cantilevered.

32. A space saving bath assembly as claimed in any one of claims 25 to 30 wherein the moveable portion is supported by a support member when in the extended
15 configuration.

33. A space saving bath assembly as claimed in claim 32 wherein the support member is an upright member affixed to the end of the bath, and which extends downwardly from the bath to make contact with a support
20 surface.

34. A space saving bath assembly as claimed in any one of claims 25 to 33 wherein a plurality of compression latches are used to latch and seal the bath in the extended configuration.

35. A space saving bath assembly as claimed in
25 any one of claims 23 to 34 wherein the assembly is a modular unit.

36. A space saving bath assembly as claimed in claim 35 wherein the modular unit is mounted upon a frame.

37. A space saving bath assembly as claimed in
30 claim 36 wherein said frame incorporates a drip tray which drains into the shower recess.

38. A space saving bath assembly as claimed in claim 37 wherein waste water from said drip tray and
35 shower recess is combined with waste water from other outlets into a single waste water outlet.

39. A space saving bath assembly as claimed in

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any one of claims 25 to 36 wherein leakage from the bath drains to the shower recess.

40. A space saving bath assembly as claimed in any one of claims 35 to 39 wherein the arrangement
5 includes a hot water inlet and a cold water inlet adapted for fitment to conventional plumbing fittings.

41. A space saving bath assembly as claimed in any one of claims 23 to 40, further comprising a spa pump and conventional spa fittings.

10 42. A space saving bath assembly as claimed in any one of claims 24 to 41 wherein the fixed portion of the bath has an overlying platform which is moveable between an overlying position when the bath is in an extended configuration and an away position when the bath
15 is in the extended configuration to allow access to the bath.

43. A space saving bath assembly as claimed in claim 42 wherein the fixed portion of the bath is housed in a cabinet.

20 44. A space saving bath assembly as claimed in claim 42 wherein the platform is load bearing.

45. A space saving bath assembly as claimed in claim 42 wherein the platform forms part of or is adjacent to a sink assembly.

25 46. A space saving bath assembly substantially as hereinbefore described with reference to the accompanying drawings.

30 47. A space saving combination shower and bath assembly substantially as hereinbefore described with reference to the accompanying drawings.

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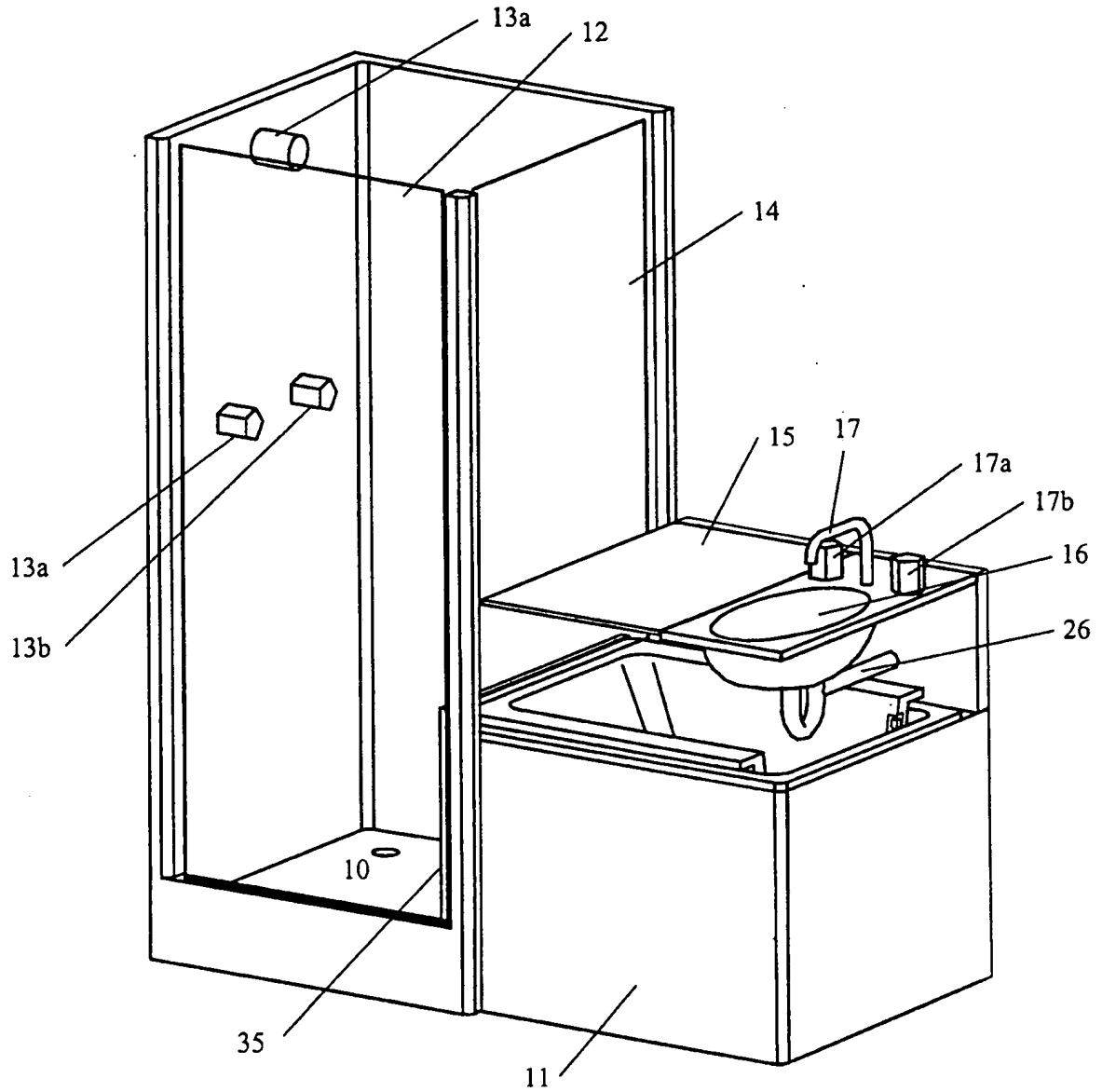


FIG. 1

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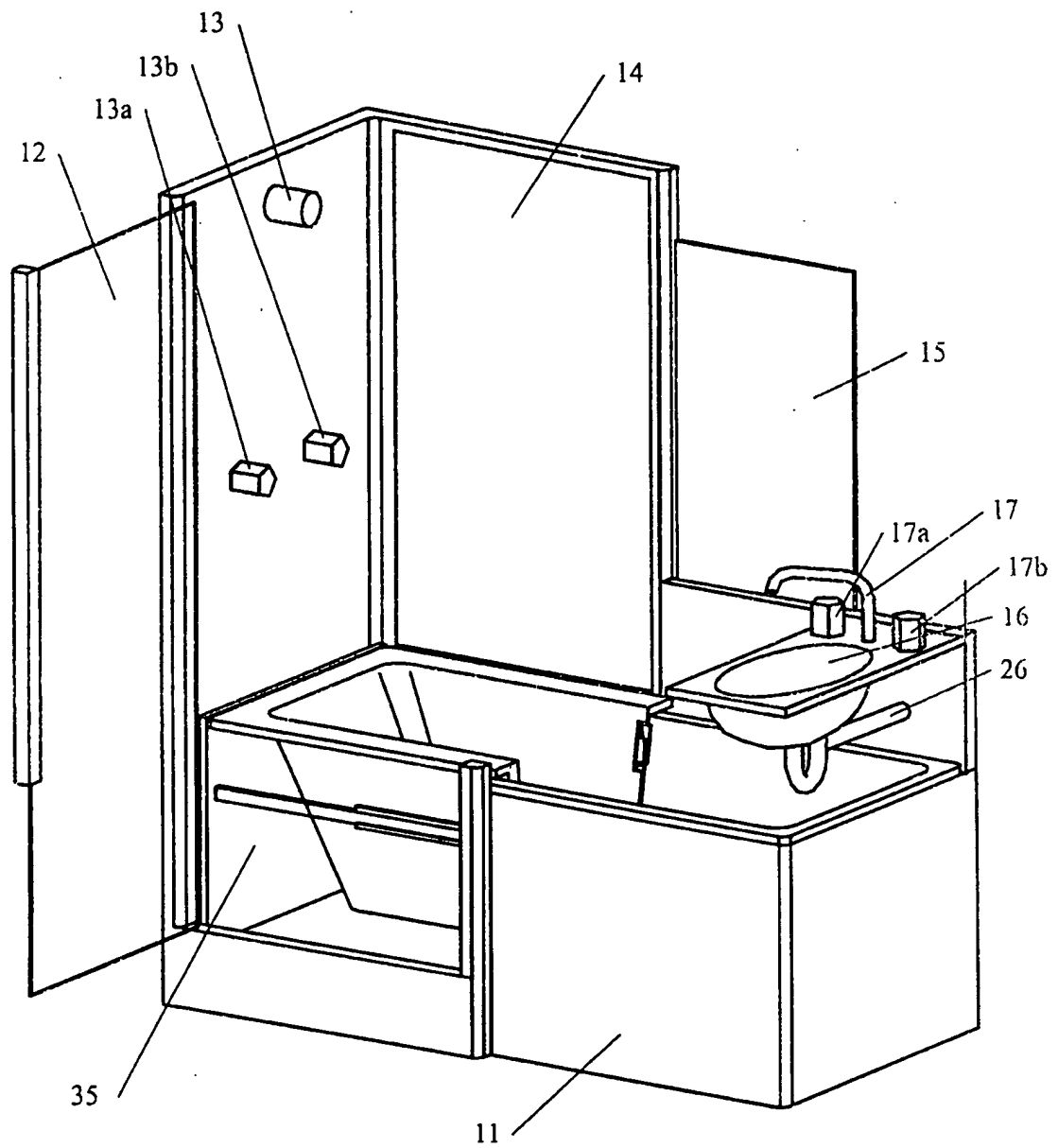


FIG. 2

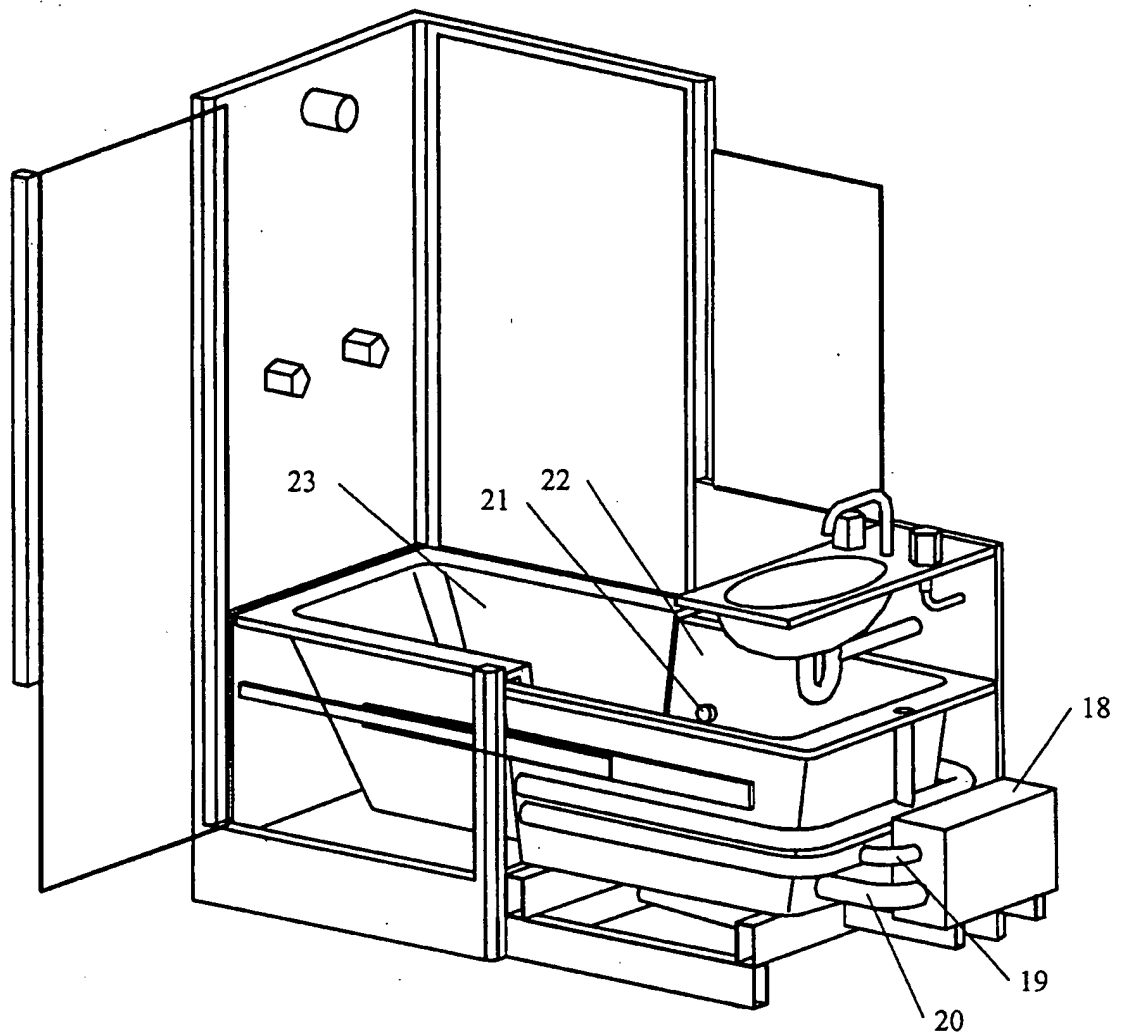


FIG. 3

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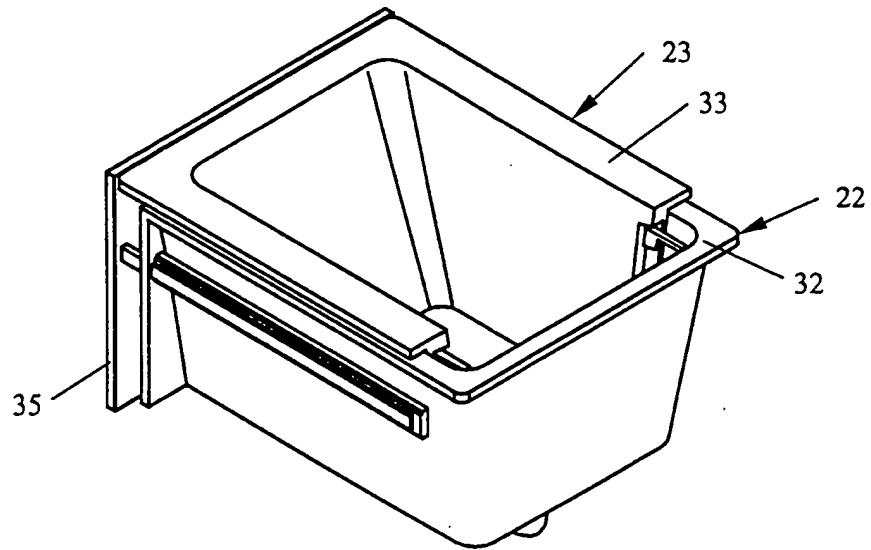


FIG. 4A

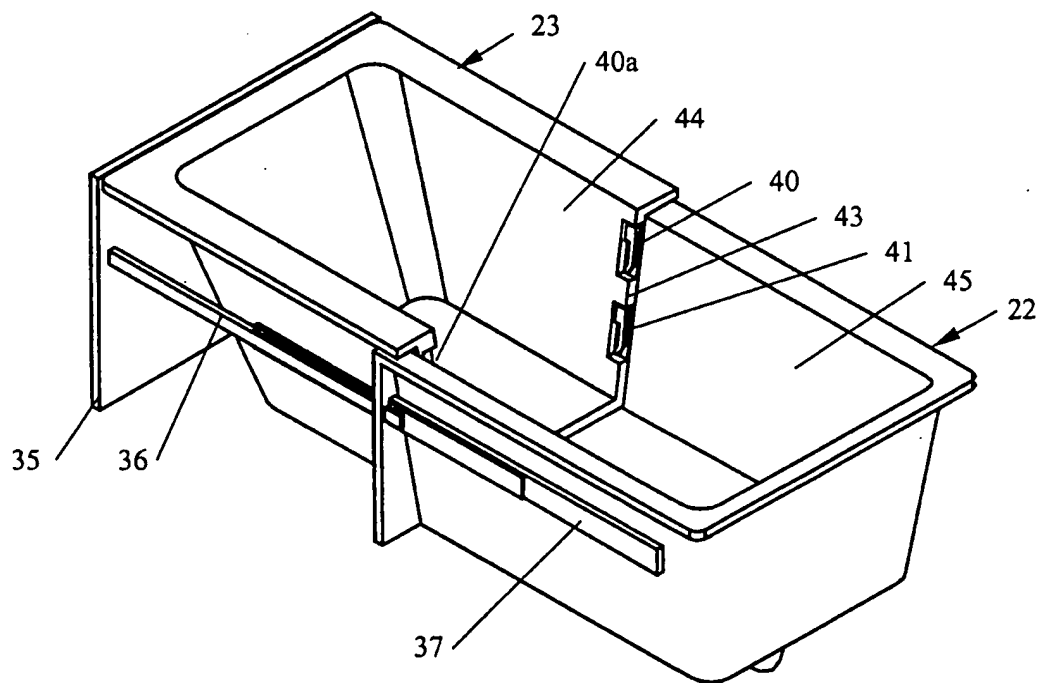


FIG. 4B

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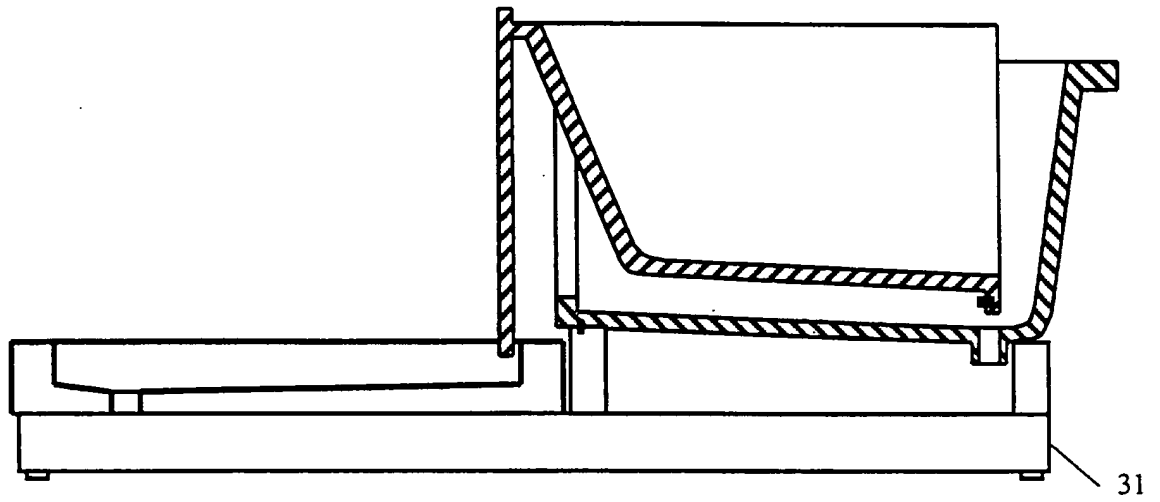


FIG. 6A

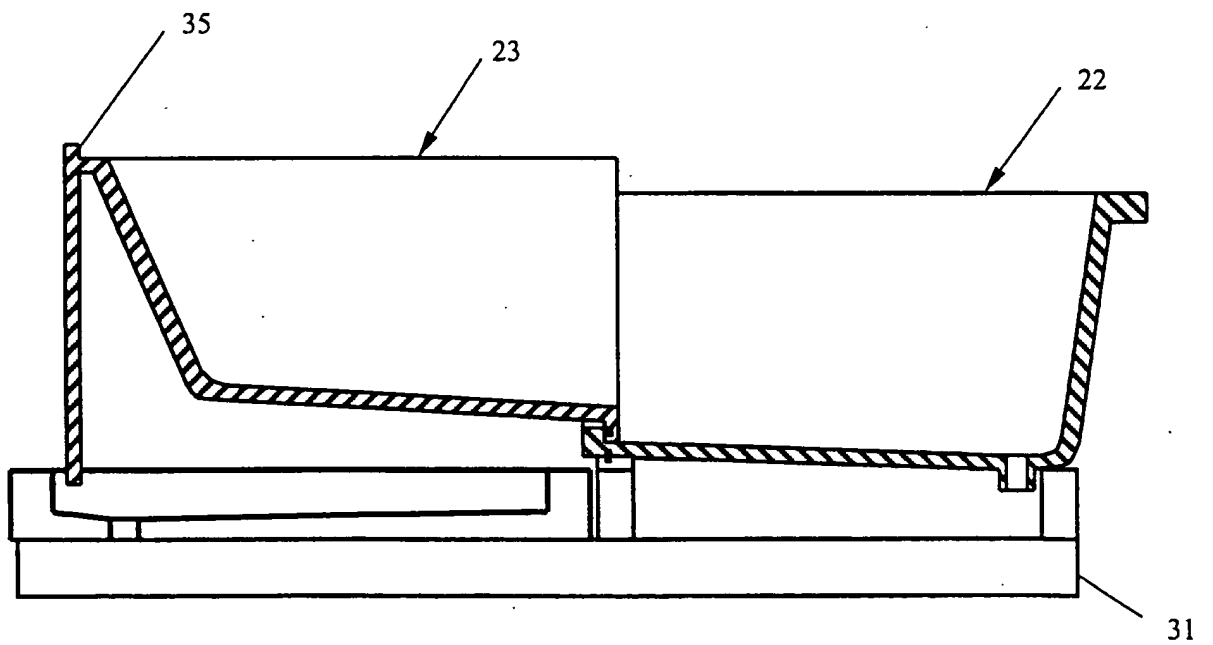


FIG. 6B

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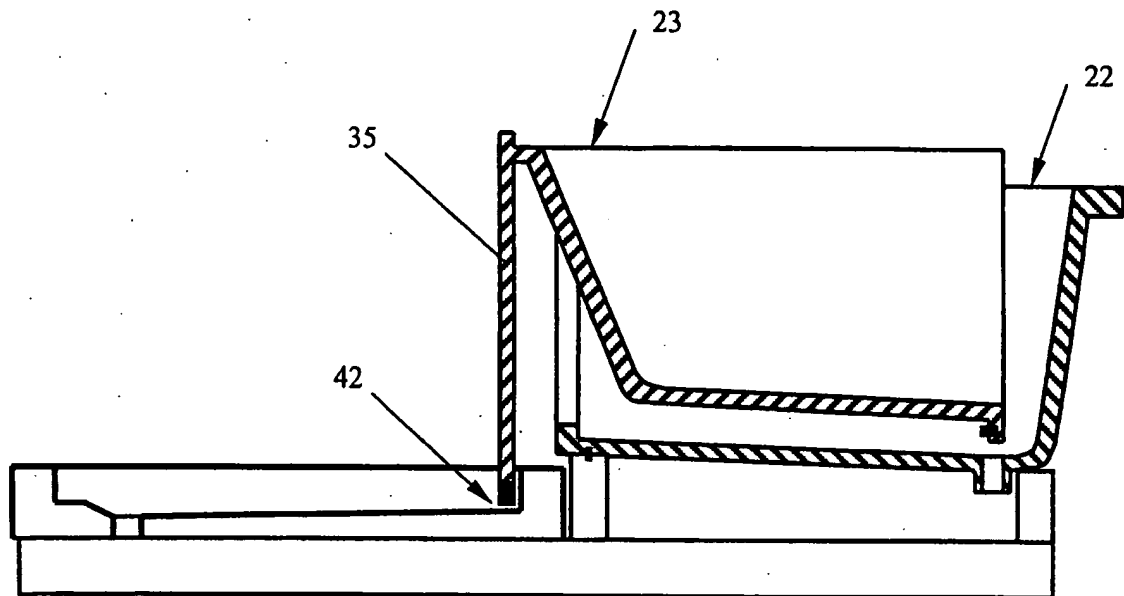


FIG. 7A

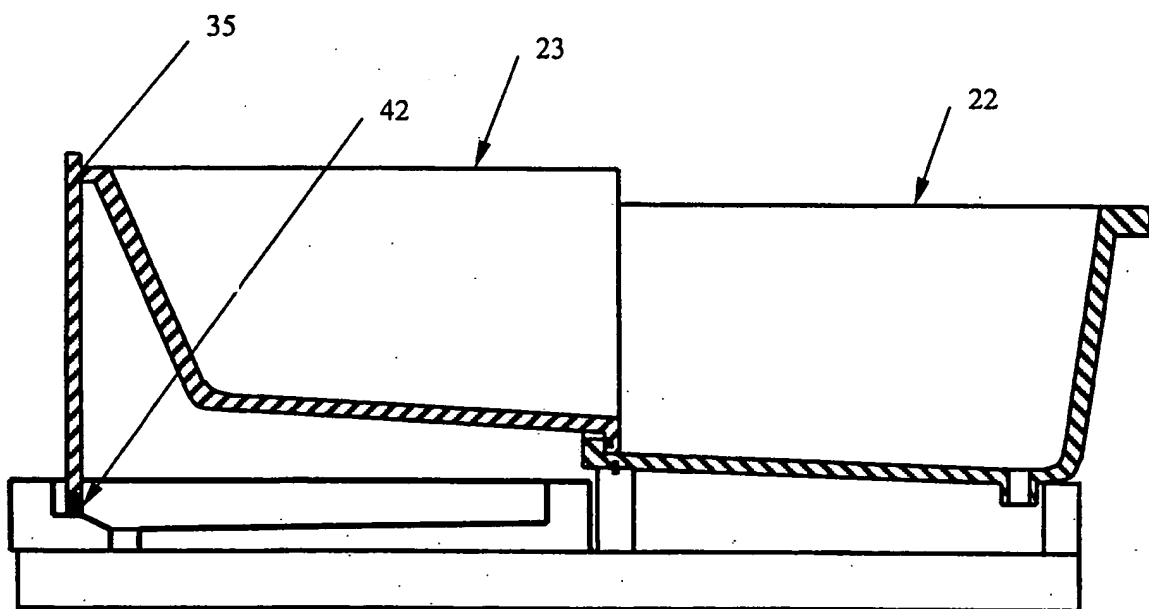


FIG. 7B

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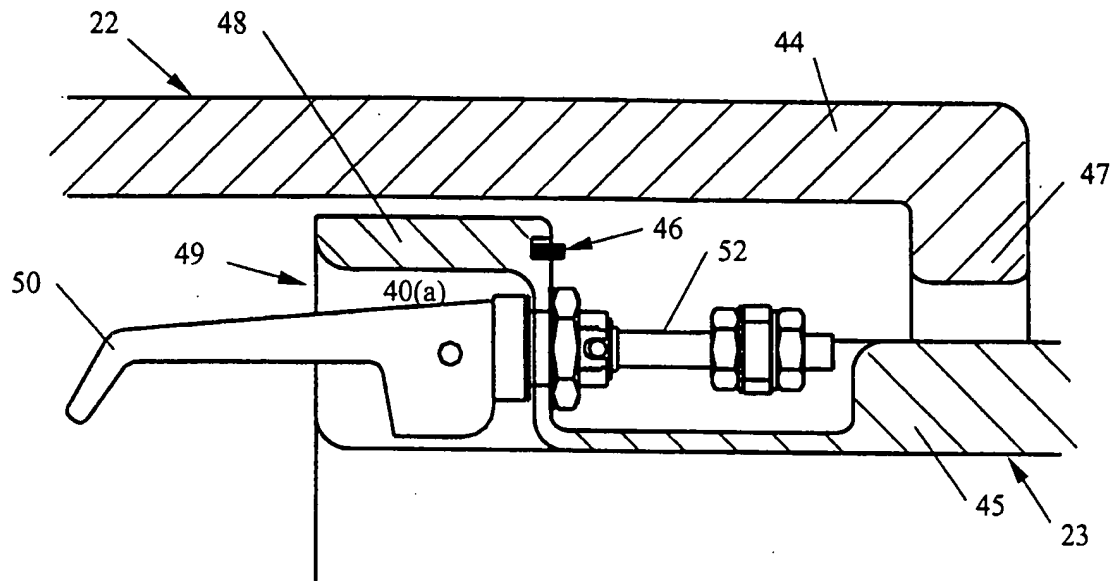


FIG. 8A

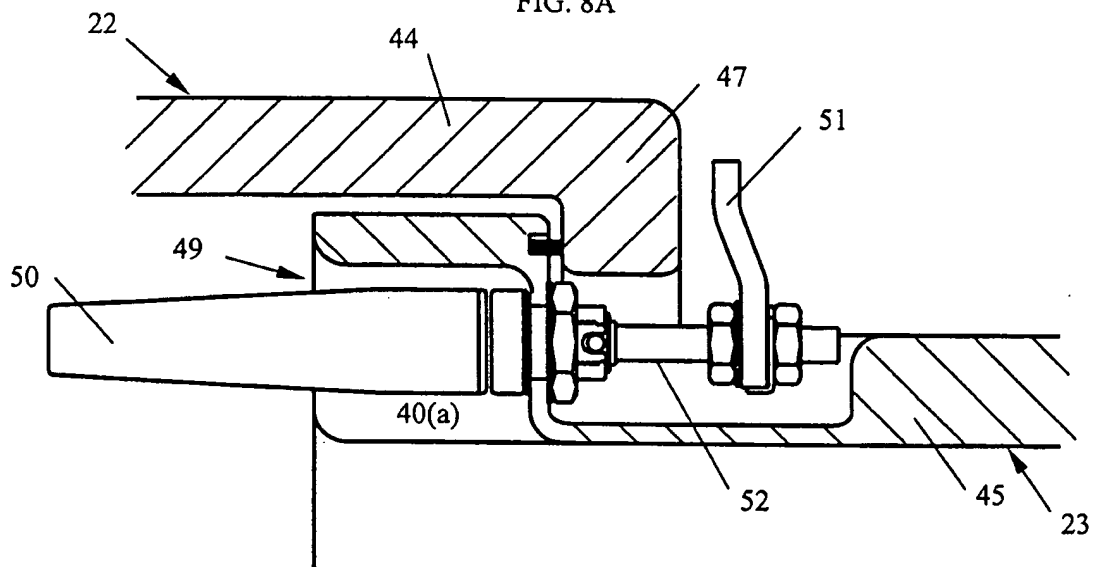


FIG. 8B

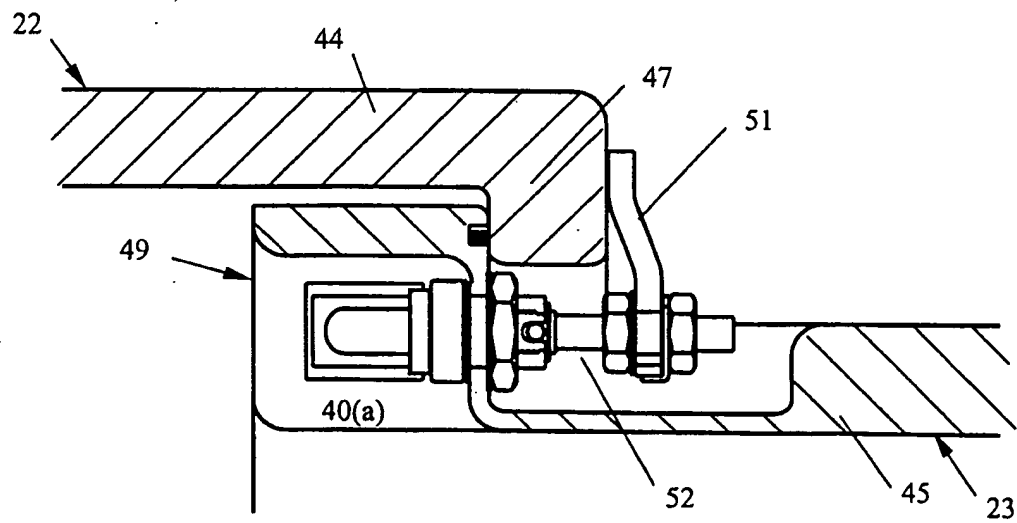


FIG. 8C

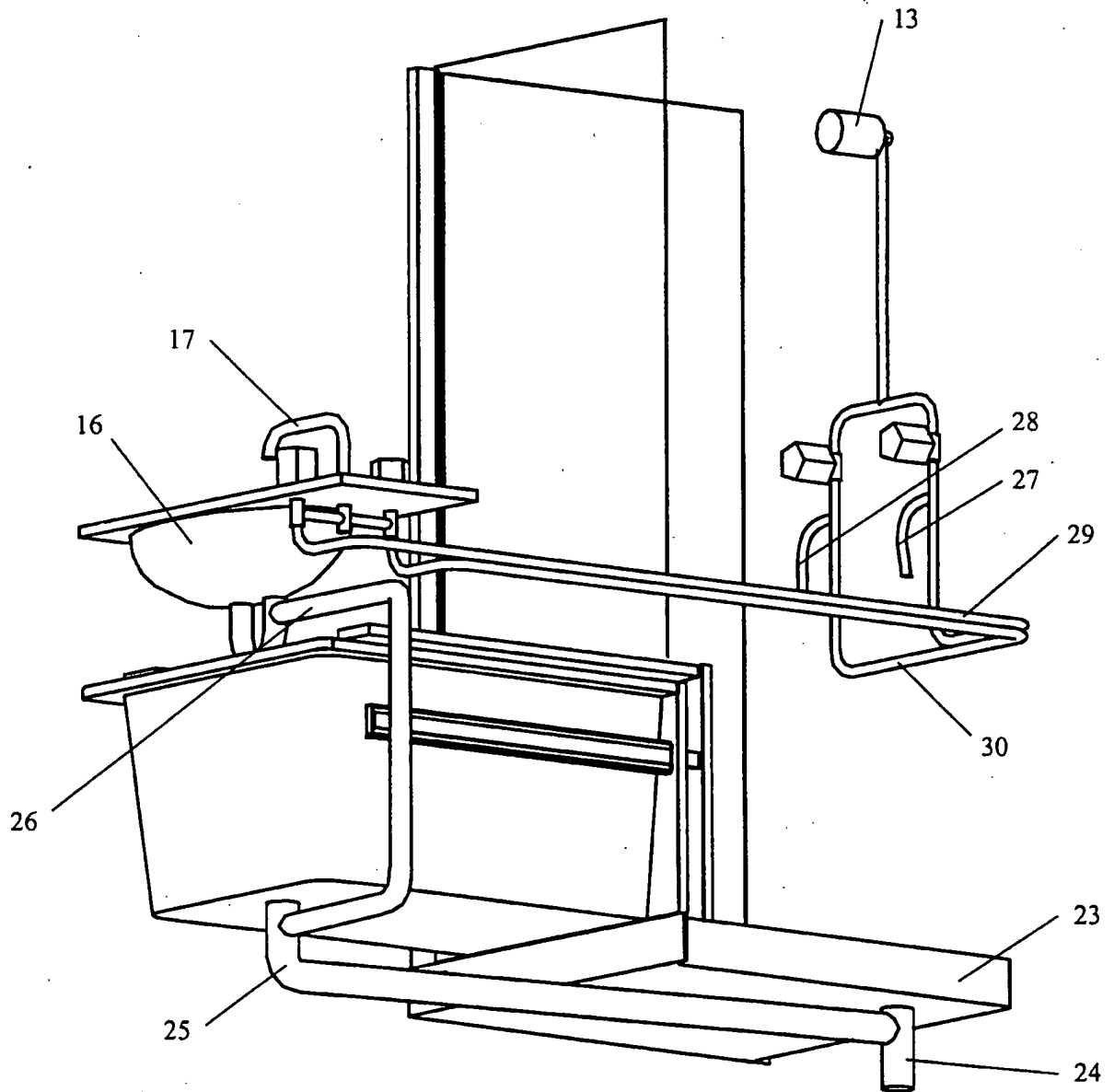


FIG. 9

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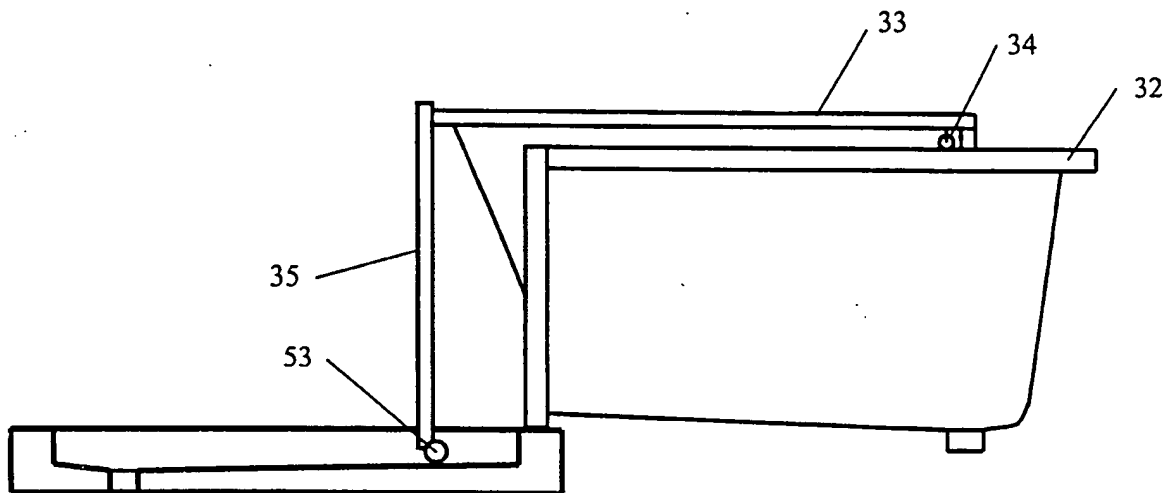


FIG. 10A

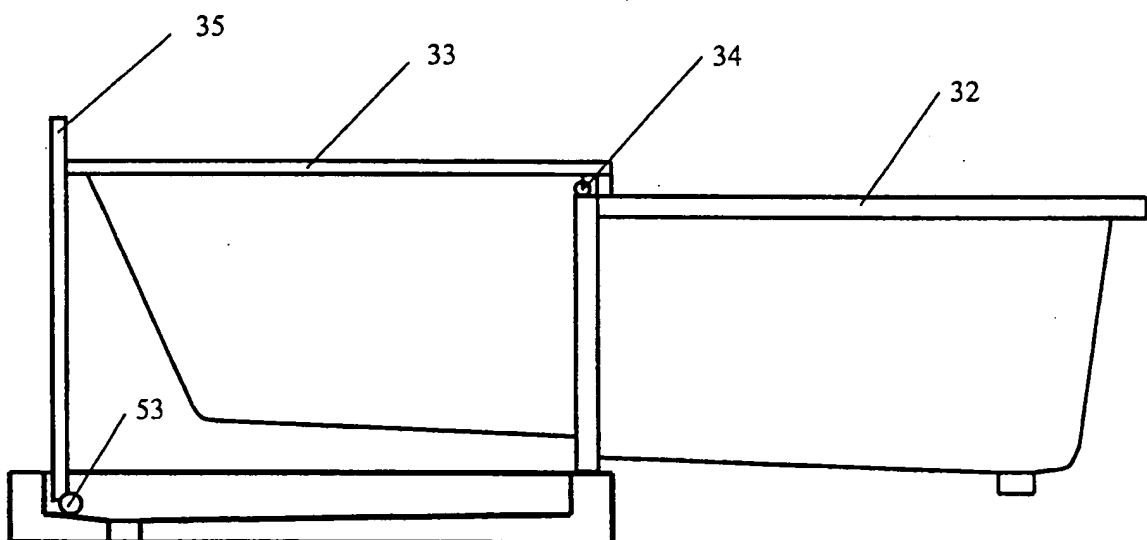
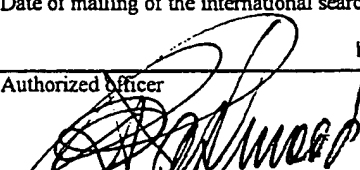


FIG. 10B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 00/00733

A. CLASSIFICATION OF SUBJECT MATTER				
Int Cl ⁷ : A47K 3/06, 3/062, 3/07; B60R 15/02; B63B 29/14				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC: A47K 3/06, 3/062, 3/07; B60R 15/02; B63B 29/14				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 4970734 A (FRIEDMAN) 20 November 1990 see column 4 lines 8-42 and column 5 lines 62-68	1-3, 11-14		
X	WO 7900790 A (NEWBURGER) 18 October 1979 see whole document	1,13,14		
X	FR 2733140 A (MASAYUKI) 25 October 1996 see whole document	1		
<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex </div>				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>* Special categories of cited documents:</p> <p>"A" Document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; vertical-align: top;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p> </td> </tr> </table>			<p>* Special categories of cited documents:</p> <p>"A" Document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
<p>* Special categories of cited documents:</p> <p>"A" Document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>			
Date of the actual completion of the international search 25 July 2000		Date of mailing of the international search report 7 AUG 2000		
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No.: (02) 6285 3929		Authorized officer  B.R. DASHWOOD Telephone No.: (02) 6283 2121		

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 00/00733

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract Accession No. 99-295397/25, Class P28, JP 11099080 A, (SEIKEN) 13 April 1999	1
X	Derwent Abstract Accession No. 96-091861/10, Class P28, JP 08000490 A, (INAX) 9 January 1996	1,2
X	Derwent Abstract Accession No. 97-071977/07, Class P28, JP 08317874 A, (TOGASHI) 3 December 1996	1
P,X	AU 36859/99 (709168) B (HASTED) 26 August 1999 See whole document	1-3, 15, 16, 19-25, 37-39, 42-45
P,X	AU 59417/99 (720257) B (HASTED) 25 May 2000 See whole document	1-3, 15, 16, 19-25, 37-39, 42-45
A	WO 9611124 A (WINDUS) 18 April 1996	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU 00/00733

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO	7900790	CA	1109208	CA	1142706	CA	1143111
		EP	18969	MX	147812	US	4357721
		US	4290473	CA	1105753		
WO	9611124	AU	35996/95	CA	2197546	EP	784547
		NZ	293525				